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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/416,501	10/08/1999	BRIAN S. DOYLE	42390.P4514D	6248

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BLAKELEY SOKOLOFF TAYLOR & ZAFMAN LLP
12400 WILSHIRE BOULEVARD
7TH FLOOR
LOS ANGELES, CA 900251026

EXAMINER

ORTIZ, EDGARDO

ART UNIT

PAPER NUMBER

2815

DATE MAILED: 10/30/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.
09/416,501

Applicant(s)

Doyle

Examiner

Edgardo Ortiz

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Oct 11, 2002
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 28-36 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 28-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

a) ☐ The translation of the foreign language provisional application has been received.

- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____ 6) ☐ Other: _____

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DETAILED ACTION

This Office Action is in response to a Request for Continued Examination and Preliminary Amendment filed October 11, 2002 on which Applicant amended claims 28 and 31.

Claim Objections

1. Claims 35 and 36 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The claims contain the limitation "wherein said metal lines, intercoupling said active devices formed on said second single crystal substrate portion, are unimpaired by heat during fabrication". The same limitation is contained on independent claims 28 and 31, from which the objected claims are dependent from, respectively.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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Claims 28-36 are rejected under 35 U.S.C. § 103 (a) as being unpatentable over Sakaguchi et. al. (U.S. Patent No. 5,966,620) in view of Applicant's acknowledged prior art figure 2. With regard to Claim 28, Sakaguchi teaches a first substrate portion (15) having a dielectric (13) on a surface and a second single crystal substrate (11) portion, wherein the dielectric layer of the first substrate portion is bonded to the second substrate portion. See figure 1E.

However, Sakaguchi fails to show active devices formed on the second single crystal substrate portion and wherein selected ones of the active devices of the second substrate portion are intercoupled via metal lines. Applicant's admitted prior art figure 2 teaches a primary substrate (202) having a first level of active devices (204) formed thereon and defining a device surface and at least a secondary substrate (Si) coupled to the device surface and selected active devices are intercoupled via metal lines (207). See also page 3, lines 14-27 and page 4, lines 1-11 of Applicant's specification. Therefore, it would have been an obvious modification to someone with ordinary skill in the art, at the time of the invention, to modify the structure as taught by Sakaguchi to include active devices formed on the second single crystal substrate portion and wherein selected ones of the active devices of the second substrate portion are intercoupled via metal lines, as clearly suggested by Applicant's admitted prior art, in order to improve the integration and bonding of semiconductor layers including transistors.

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Additionally, the claim contains the limitation "the first substrate portion formed of less than an entire portion of a starting material by demarcating a film thickness through ion implantation into the starting material and separating the first substrate portion from the starting material". It is noted that this is a product by process limitation. A "product by process" claim is directed to the product per se, no matter how actually made, *In re Brown*, 173 USPQ 685; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 161; *In re Wertheim*, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); *In re Marosi et al*, 218 USPQ 289; and particularly *In re Thorpe*, 227 USPQ 964, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above case law makes clear.

Lastly, the claim contains the limitation "wherein said metal lines, intercoupling said active devices formed on said second single crystal substrate portion, are unimpaired by heat during fabrication", this is an intended use limitation. It has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. *Ex Parte Masham*, 2 USPQ F.2d 1647 (1987).

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With regard to Claim 29, a further difference between Sakaguchi and the claimed invention is, a plurality of devices formed on the first substrate portion. Applicant's admitted prior art figure 2 teaches a primary substrate (202) having a first level of devices (204) formed thereon and defining a device surface. Therefore, it would have been an obvious modification to someone with ordinary skill in the art, at the time of the invention, to modify the structure as taught by Sakaguchi to include a plurality of devices formed on the first substrate portion, as suggested by pages 3-4 of the instant application disclosure describing the prior art, in order to improve integration of semiconductor devices, such as transistors, into a single substrate layer.

With regard to Claim 30, a further difference between the claimed invention and Sakaguchi is, selected ones of the devices of the first substrate portion and selected ones of the devices of the second substrate portion that are interconnected. Applicant's admitted prior art figure 2 teaches selected ones of the first level of devices (204) of the primary substrate (202) and selected ones of the devices (208) of the secondary substrate (Si) that are interconnected. Therefore, it would have been an obvious modification to someone with ordinary skill in the art, at the time of the invention, to modify the structure as taught by Sakaguchi to include selected ones of the devices of the first substrate portion and selected ones of the devices of the second substrate portion that are interconnected, as suggested by pages 3-4 of the instant application disclosure describing the prior art, in order to improve the integration and bonding of semiconductor layers including transistors.

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With regard to Claim 31, Sakaguchi teaches a primary substrate (15) and at least a secondary single crystal substrate coupled to the primary substrate.

However, Sakaguchi fails to teach devices formed on the primary substrate and the secondary substrate and selected active devices of the secondary single crystal substrate intercoupled via metal lines. Applicant's admitted prior art figure 2 teaches a primary substrate (202) having a first level of active devices (204) formed thereon and defining a device surface and at least a secondary substrate (Si) coupled to the device surface and having a layer (206) which contains active devices (208), wherein selected active devices (204) on the primary substrate are intercoupled via metal lines (207). Therefore, it would have been an obvious modification to someone with ordinary skill in the art, at the time of the invention, to modify the structure as taught by Sakaguchi to include devices formed on the primary substrate and the secondary substrate and selected active devices of the secondary single crystal substrate intercoupled via metal lines, as clearly suggested by Applicant's admitted prior art, in order to improve the integration and bonding of semiconductor layers including transistors.

Additionally, the claim contains the limitation "wherein said metal lines, intercoupling said active devices formed on said second single crystal substrate portion, are unimpaired by heat during fabrication", this is an intended use limitation. It has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed

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apparatus from a prior art apparatus satisfying the claimed structural limitations. Ex Parte Masham, 2 USPQ F.2d 1647 (1987).

With regard to Claim 32, a further difference between the claimed invention and Sakaguchi is, selected ones of the devices of the primary substrate portion and selected ones of the devices of the secondary substrate portion that are interconnected. Applicant's admitted prior art figure 2 teaches selected ones of the first level of devices (204) of the primary substrate (202) and selected ones of the devices (208) of the secondary substrate (Si) that are interconnected. Therefore, it would have been an obvious modification to someone with ordinary skill in the art, at the time of the invention, to modify the structure as taught by Sakaguchi to include selected ones of the devices of the first substrate portion and selected ones of the devices of the second substrate portion that are interconnected, as suggested by pages 3-4 of the instant application disclosure describing the prior art, in order to improve the integration and bonding of semiconductor layers including transistors.

With regard to Claims 33 and 34, Sakaguchi teaches a substrate (11) which is made of single crystal silicon and which, as shown on figure 1B, can have a dielectric layer (13) deposited over the layer. Therefore, it would have been an obvious modification to someone with ordinary skill in the art, at the time of the invention, to provide the first or primary substrate as a single crystal silicon layer, in order to maintain uniform crystallinity between the two bonded substrates.

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With regard to Claims 35 and 36, the claims contain the limitation “wherein said metal lines, intercoupling said active devices formed on said second single crystal substrate portion, are unimpaired by heat during fabrication”, this is an intended use limitation. It has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. *Ex Parte Masham*, 2 USPQ F.2d 1647 (1987).

Response to Arguments

3. Applicant's arguments with respect to claims 28-36 have been fully considered but are not deemed persuasive for the reasons stated in the body of the office action. Applicant argues, regarding the obviousness rejection of claims 28 and 31, that “ neither Sakaguchi nor FIG. 2 discloses metal lines, intercoupling active devices formed on a second single crystal substrate, which are unimpaired by heat during fabrication”. However, the examiner disagrees and notes that as shown above, Sakaguchi teaches a first substrate portion (15) having a dielectric (13) on a surface and a second single crystal substrate (11) portion, wherein the dielectric layer of the first substrate portion is bonded to the second substrate portion and Applicant's admitted prior art figure 2, teaches a primary substrate (202) having a first level of active devices (204) formed thereon and defining a device surface and at least a secondary substrate (Si) coupled to the device surface and selected active devices are intercoupled via metal lines (207). Therefore, the

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combination of Sakaguchi and Applicant's admitted prior art clearly suggest the structure of the claimed invention.

Applicant further argues that "Sakaguchi does not teach or suggest providing a second single crystal substrate portion having active devices formed thereon in which the active devices are intercoupled via metal lines, much less forming active devices on a second layer made of single silicon crystal without damaging metal lines coupled between the active devices". As clearly pointed out in the rejection, Sakaguchi was cited for the teaching of a first substrate portion (15) having a dielectric (13) on a surface and a second single crystal substrate (11) portion, wherein the dielectric layer of the first substrate portion is bonded to the second substrate portion.

Sakaguchi was not cited for the teachings of active devices intercoupled via metal lines, Applicant's admitted prior art was cited for this particular teaching.

Applicant's also argues that "Applicant's specification also does not disclose or suggest a second single crystal substrate portion having active devices formed thereon and intercoupled via metal lines, wherein the metal lines, intercoupling the active devices are unimpaired by heat during fabrication". The examiner notes that as clearly shown on figure 2 of Applicant's admitted prior art, there is a primary substrate (202) having a first level of active devices (204) formed thereon and defining a device surface and at least a secondary substrate (Si) coupled to the device surface and selected active devices are intercoupled via metal lines (207). As to the limitation of metal

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lines unimpaired by heat during fabrication, the claimed invention does not patentably or structurally distinguish from that taught by Sakaguchi and Applicant's admitted prior art, which teaches all of the structural limitations.

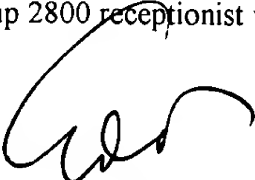
Lastly, regarding dependent claims 29, 30 and 32-36, Applicant relies on the arguments presented for claims 28 and 31 and thus the examiner's response applies to the dependent claims as well. Therefore, the claimed invention of claims 28-36 does not structurally or patentably distinguish over that taught by Sakaguchi and Applicant's admitted prior art and the rejection is maintained.

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Edgardo Ortiz (Art Unit 2815), whose telephone number is (703) 308-6183 or by fax at (703) 308-7722. In case the Examiner can not be reached, you might call Supervisor Eddie Lee at (703) 308-1690. Any inquiry of a general nature or relating to the status of this application should be directed to the Group 2800 receptionist whose telephone number is (703) 308-0956.

EO/AU 2815

10/24/02



EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800